127. (CURRENTLY AMENDED) A modified nucleic acid oligomer comprising a nucleic acid oligomer attached to a single redox-active moiety, wherein the redox-active moiety comprises at least one electron-donor molecule and at least one electron-acceptor molecule, the at least one electron-donor molecule and the at least one electron-acceptor molecule not being joined by a nucleic acid oligomer.

128. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety comprises at least one redox-active moiety, linked, to at least one bimolecular electron-donor/electron-acceptor complex, at least one electron-donor molecule of the redox-active moiety and at least one electron-acceptor molecule of the redox-active moiety being joined with one another via one or more bonds.

129. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 128, wherein the one or more bonds are covalent bonds.

130. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety comprises at least one redox-active moiety, linked, to at least one bimolecular electron-donor/electron-acceptor complex, at least one electron-donor molecule of the redox-active moiety and at least one electron-acceptor molecule of the redox-active moiety being covalently joined via one or more branched or linear molecular moieties of any composition and chain length.

131. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 130, wherein the branched or linear molecular moieties have a chain length of 1 – 20 atoms.

132. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 130, wherein the branched or linear molecular moieties have a chain length of 1-14 atoms.

133. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety additionally comprises one or more macromolecules.

134. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety is the native or modified reaction center of photosynthesizing organisms.

135. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 134, wherein the redox-active moiety is the native or modified reaction center of photosynthesizing bacteria.

136. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein at least one of the electron-donor molecules and electron-acceptor molecules is a pigment.

137. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 136, wherein the pigment is a flavin, a (metallo)porphyrin, a (metallo)chlorophyll, a (metallo)bacteriochlorophyll, or a derivative of these pigments.

138. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein at least one of the electron-donor molecules and electron-acceptor molecules is a nicotinamide or a quinone.

139. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 138, wherein the quinone is a pyrroloquinoline quinone (PQQ), a 1,2-benzoquinone, a 1,4-benzoquinone, a 1,2-naphthoquinone, a 1,4-naphthoquinone, a 9,10-anthraquinone, or one of their derivatives.

140. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein at least one of the electron-donor molecules and electron-acceptor molecules is a charge transfer complex.

141. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 140, wherein the charge transfer complex is a transition metal complex.

142. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 141, wherein the charge transfer complex is a Ru(II), Cr(III), Fe(II), Os(II), or Co(II) complex.

143. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein the modified nucleic acid oligomer can sequence-specifically bind single-strand DNA, RNA, and/or PNA.

144. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 143, wherein the modified nucleic acid oligomer is a deoxyribonucleic acid oligomer, a ribonucleic acid oligomer, or a peptide nucleic acid oligomer.

145. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety is covalently bound to one of the phosphoric-acid groups, to one of the carboxylic-acid groups, to one of the amine groups, or to a sugar of the nucleic acid oligomer backbone.

146. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety is covalently bound to a sugar-hydroxy group of the nucleic acid oligomer backbone.

147. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety is covalently attached to a thiol group, a hydroxyl group, a carboxylic-acid group, or an amine group of a modified base of the nucleic acid oligomer.

148. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 147, wherein the reactive thiol, hydroxyl, carboxylic-acid, or amine group of the base is covalently bound to the base via a branched or linear molecular moiety of any composition and chain length, the shortest continuous link between the thiol, hydroxyl, carboxylic-acid, or amine group and the base being a branched or linear molecular moiety having a chain length of 1-20 atoms.

149. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 148, wherein the shortest continuous link between the thiol, hydroxyl, carboxylic-acid, or amine group and the base is a branched or linear molecular moiety having a chain length of 1-14 atoms.

150. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 145, wherein the redox-active moiety is attached to an end of the nucleic acid oligomer backbone or to a terminal modified base.

151. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety is photoinducibly redox-active moiety.

152. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein, redox-active moiety is a chemically-inducibly redox-active moiety.

153. (PREVIOUSLY PRESENTED) The modified nucleic acid oligomer according to claim 127, wherein multiple redox-active moieties are attached to the nucleic acid oligomer.

154. (PREVIOUSLY PRESENTED) A method of producing a modified nucleic acid oligomer according to claim 127, comprising covalently attaching a nucleic acid oligomer to a redox-active moiety wherein the redox-active moiety comprises at least one electron-donor molecule and at least one electron-acceptor molecule, the electron-donor molecule and the electron-acceptor molecule not being joined with one another by nucleic acid oligomers.

155. (PREVIOUSLY PRESENTED) The method of producing a modified nucleic acid oligomer according to claim 154, wherein the redox-active moiety is attached to the nucleic acid oligomer by covalently attaching at least one electron-donor molecule.

156. (PREVIOUSLY PRESENTED) The method of producing a modified nucleic acid oligomer according to claim 154, wherein the redox-active moiety is attached to the nucleic acid oligomer by covalently attaching at least one electron-acceptor molecule.

157. (PREVIOUSLY PRESENTED) The method of producing a modified nucleic acid oligomer according to claim 154, wherein the redox-active moiety is attached to the nucleic acid oligomer by covalently attaching at least one macromolecule or protein.

158. (PREVIOUSLY PRESENTED) The method of producing a modified nucleic acid oligomer according to claim 155, wherein the redox-active moiety is completed by adding at least one component selected from electron-acceptor molecules, electron-donor molecules, macromolecules and proteins.

159. (PREVIOUSLY PRESENTED) The method of producing a modified nucleic acid oligomer according to claim 154, wherein the nucleic acid oligomer is bound to the redox-active moiety by one or more amidations with amine or acid groups of the redox-active moiety, by one or more esterifications with alcohol or acid groups of the redox-active moiety, by thioester formation with thioalcohol or acid groups of the redox-active moiety, or by condensation of one or more amine groups of the nucleic acid oligomer with aldehyde groups of the redox-active moiety and subsequent reduction of the resultant carbon-nitrogen double bond.

160. (PREVIOUSLY PRESENTED) The method of producing a modified nucleic acid oligomer according to claim 159, wherein at least one branched or linear molecular moiety of any composition and chain length is covalently attached to the redox-active moiety and the branched or linear molecular moiety has a reactive amine, hydroxyl, thiol, acid, or aldehyde group for covalent attachment to a nucleic acid oligomer.

161. (PREVIOUSLY PRESENTED) The method of producing a modified nucleic oligomer according to claim 160 wherein the shortest continuous link between the nucleic acid oligomer and the redox-active moiety is a branched or linear molecular moiety having a chain length of 1-20 atoms.

162. (PREVIOUSLY PRESENTED) The method of producing a modified nucleic acid oligomer according to claim 161, wherein the shortest continuous link between the nucleic acid oligomer and the redox-active moiety is a branched or linear molecular moiety having a chain length of 1-14 atoms.

163. (PREVIOUSLY PRESENTED) A modified conductive surface, comprising at least one type of modified nucleic acid oligomer according to claim 127 attached to a conductive surface.

164. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 163, wherein the surface is a metal or a metal alloy.

165. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 164, wherein the surface is a metal selected from platinum, palladium, gold, cadmium, mercury, nickel, zinc, carbon, silver, copper, iron, lead, aluminum and manganese.

166. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 163, wherein the surface is a semiconductor.

167. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 166, wherein the surface is a semiconductor selected from carbon, silicon, germanium and tin.

168. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 163, wherein the surface consists of a binary compound of the elements of groups 14 and 16, a binary compound of the elements of groups 13 and 15, a binary compound of the elements of groups 15 and 16, or a binary compound of the elements of groups 11 and 17.

169. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 168, wherein the surface consists of a Cu(i) halide or an Ag(i) halide.

170. (PREVIOUSLY PRESENTED) A modified conductive surface according to claim 163, wherein the surface consists of a ternary compound of the elements of groups 11, 13 and 16, or a ternary compound of the elements of groups 12, 13 and 16.

171. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 163, wherein the attachment of the modified nucleic acid oligomers to the conductive surface occurs covalently or by chemisorption or physisorption.

172. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 163, wherein one of the phosphoric-acid, carboxylic-acid or amine groups of a sugar group of the nucleic acid oligomer backbone is attached, covalently or by chemisorption or physisorption, to the conductive surface.

173. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 172, wherein a sugar-hydroxyl group of the nucleic acid oligomer backbone is attached, covalently or by chemisorption or physisorption, to the conductive surface.

174. (PREVIOUSLY PRESENTED) A modified conductive surface according to claim 163, wherein a thiol group, a hydroxyl group, a carboxylic-acid group, or an amine group of a modified base of the nucleic acid oligomer is attached, covalently or by chemisorption or physisorption, to the conductive surface.

175. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 172, wherein the modified nucleic acid oligomer is bound to the conductive surface via a group at the end of the nucleic acid oligomer backbone or via a group of a terminal, modified base.

176. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 163, wherein branched or linear molecular moieties of any composition and chain length are attached, covalently or by chemisorption or physisorption, to the conductive surface and the modified nucleic acid oligomers are covalently attached to these molecular moieties.

177. (PREVIOUSLY PRESENTED)) The modified conductive surface according to claim 176, wherein the shortest continuous link between the conductive surface and the nucleic acid oligomer is a branched or linear molecular moiety having a chain length of 1-20 atoms.

178. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 176, wherein the shortest continuous link between the conductive surface and the nucleic acid oligomer is a branched or linear molecular moiety having a chain length of 1-12 atoms.

179. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 176, wherein the branched or linear molecular moiety is attached to a

phosphoric-acid group, a carboxylic-acid group, an amine group, or a sugar group of the nucleic acid oligomer backbone or a thiol, hydroxyl, carboxylic-acid, or amine group of a modified base of the nucleic acid oligomer.

180. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 179, wherein the branched or linear molecular moiety is attached to a sugar-hydroxyl group of the nucleic acid oligomer backbone.

181. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 179, wherein the branched or linear molecular moiety is bound to a phosphoric-acid, sugar-hydroxy, carboxylic-acid, or amine group at the end of the nucleic acid oligomer backbone or to a thiol, hydroxyl, carboxylic acid, or amine group of a terminal, modified base.

182. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 163, wherein predominantly one type of modified nucleic acid oligomer each is attached in a spatially delocalized manner to the conductive surface.

183. (PREVIOUSLY PRESENTED) The modified conductive surface according to claim 182, wherein only one type of modified nucleic acid oligomer each is attached in a spatially delocalized manner to the conductive surface.

184. (PREVIOUSLY PRESENTED) A method of producing the modified conductive surface according to claim 163, comprising attaching the at least one type of modified nucleic acid oligomer to the conductive surface.

185. (PREVIOUSLY PRESENTED) The method of producing a modified conductive surface according to claim 184, wherein the at least one type of nucleic acid oligomer is applied to a conductive surface and, subsequently, a modification of the nucleic acid oligomer is carried out.

186. (PREVIOUSLY PRESENTED) The method of producing a modified conductive surface according to claim 184, wherein the nucleic acid oligomers or the modified nucleic acid oligomers are hybridized with the respective complementary nucleic acid oligomer strand and applied to the conductive surface in the form of the double-strand hybrid.

187. (PREVIOUSLY PRESENTED) The method of producing a modified conductive surface according to claim 184, wherein the nucleic acid oligomer or the modified nucleic acid oligomer is applied to the conductive surface in the presence of further chemical compounds that are likewise attached to the conductive surface.

188. (PREVIOUSLY PRESENTED) A method of electrochemically detecting oligomer hybridization events, comprising contacting at least one modified conductive surface according to claim 163 with nucleic acid oligomers followed by detection of electrical communication between the redox-active moiety and the conductive surface.

189. (PREVIOUSLY PRESENTED) The method of electrochemically detecting oligomer hybridization events according to claim 188, wherein detection takes place by cyclic voltammetry, amperometry or conductivity measurement.

190. (PREVIOUSLY PRESENTED) The method of electrochemically detecting oligomer hybridization events according to claim 188, wherein electrochemical detection is initiated by photoinduced charged separation in the photoinducibly redox-active moiety attached to the conductive surface via a nucleic acid oligomer.

191. (PREVIOUSLY PRESENTED) The method of electrochemically detecting oligomer hybridization events according to claim 190, wherein the light irradiation for photoinduced charge separation in the photoinducibly redox-active moiety attached to the conductive surface via a nucleic acid oligomer is limited to an area of the conductive surface having at least one type of modified nucleic acid oligomer.

192. (PREVIOUSLY PRESENTED) The method of electrochemically detecting oligomer hybridization events according to claim 190, wherein the photoinducibly redox-active moiety's oxidized electron-donor molecule resulting from irradiation with light of a specific or any given wavelength is restored to the state it was originally in prior to light irradiation by is rereduction by a suitable free redox-active substance that is not bound to but in contact with the nucleic acid oligomer.

193. (PREVIOUSLY PRESENTED) The method of electrochemically detecting oligomer hybridization events according to claim 190, wherein the photoinducibly redox-active moiety's reduced electron-acceptor molecule resulting form irradiation with light of a specific or any given wavelength is restored to the state it was originally in prior to light irradiation by reoxidation by a suitable free redox-active substance that is not bound to but in contact with the nucleic acid oligomer.

194. (PREVIOUSLY PRESENTED) The method of electrochemically detecting oligomer hybridization events according to claim 188, wherein the electrochemical detection is facilitated by a free redox-active substance that effectuates a thermal charge transfer to the redox-active moiety.

195. (PREVIOUSLY PRESENTED) The method of electrochemically detecting oligomer hybridization events according to claim 193, wherein the free redox-active substance that is not bound to but in contact with the nucleic acid oligomer is selectively oxidizable and reducible at a potential φ, where φ satisfies the condition $2.0\ V \geq \varphi \geq -2.0\ V$, measured against normal hydrogen electrode.

196. (PREVIOUSLY PRESENTED) The method of electrochemically detecting oligomer hybridization events according to claim 192, wherein the free redox-active substance that is not bound to but in contact with the nucleic acid oligomer is a free quinone, a free hexacyanoferrate(II) complex, a free sodium ascorbate, a free Ru(II)hexamine complex, or a free redox-active protein.

197. (PREVIOUSLY PRESENTED) The method of electrochemically detecting oligomer hybridization events according to claim 196, wherein the free redox-active substance that is not bound to but in contact with the nucleic acid oligomer is a free cytochrome.